

10/539579

APPLICATION UNDER UNITED STATES PATENT LAWS

JC17 Rec'd PCT/PTO 17 JUN 2005

Atty. Dkt.: 2545-0476

Invention: Labelling And/Or Marking Machine

Inventor(s): SERNESI, Marco

REMELLI, Giacomo

CAVALLARI, Stefano

Harbin King & Klima

500 Ninth Street SE
Washington DC 20003
202-543-6404 Voice
202-543-9230 Fax

This is a:

- ☐ Provisional Application
- ☐ Regular Utility Application
- ☐ Continuing Application
 - ☐ The contents of the parent are incorporated by reference
- ☒ PCT National Phase Application
- ☐ Design Application
- ☐ Reissue Application
- ☐ Plant Application

SPECIFICATION

This application claims priority to Italian Patent application number BO2002A 000806, filed December 20, 2002, which is incorporated by reference herein.

1 JC17 Rec'd PCT/PTO 17 JUN 2005

DescriptionA labelling and/or marking machineTechnical Field

The present invention relates to a labelling and/or marking machine.

5 More exactly, the invention concerns a machine serving to affix and/or apply labels and/or symbols and/or lettering to containers, generally considered, in which the containers are advanced by a conveyor equipped with devices designed to check and adjust the angular position of the selfsame containers.

Background Art

10 Conventionally, in machines of the aforementioned type, containers are caused to advance by a revolving carousel that presents a disc carrying a plurality of pedestals equispaced angularly around the periphery and serving each to support a respective container; each pedestal is power driven and rotatable about the
15 axis of the relative container.

The path along which the containers are directed by the conveyor passes through labelling or marking stations where a fixed and predetermined portion of the lateral surface presented by the container will
20 be offered to each such station.

/

To the end of controlling the angular position of the containers positioned on the pedestals so that they will always be correctly aligned when brought into the labelling or marking stations, the prior art
5 embraces the use of optical sensors connected to a control unit piloting the operation of the motors associated with the single pedestals.

More exactly, the optical sensors in question can be photocells capable of detecting a notch presented
10 by each container, for example, or TV cameras able to process more complex reference images.

It will be observed however that in the case of photocell type sensors, each container must be provided with a reference notch located in a clearly
15 visible position, and there are constraints also on the geometry of the container, which for example cannot have sharp edges, whilst the external surface must be treated so as to render it non-reflective as far as possible, and with colours that will ensure
20 the reference elements are easily read. This means a restricted range of application and limited reliability, especially with successive changes in the size, shape and specifications of containers.

In the case of TV cameras, on the other hand, it
25 should be emphasized that this solution is penalized by excessively high cost, also by the fact that sophisticated and complex image-processing systems are required, and is therefore unsuitable for monitoring operations in machines of the type in
30 question. In addition, it will be appreciated that a

television camera is able to operate only in certain conditions of brightness and with a given level of reflection from the surface of the container.

The object of the present invention is to provide a
5 labelling and/or marking machine unaffected by the drawbacks mentioned above.

Disclosure of the Invention

The stated object is realized in a labelling and/or marking machine of which the characterizing features are as recited in one or more of the claims appended.

10 The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

-figure 1 illustrates a portion of a filling unit for containers comprising the labelling and/or marking
15 machine according to the present invention, seen in a schematic plan view;

-figure 2 is an enlarged detail of figure 1, viewed in a side elevation and with certain parts omitted.

Referring to figure 1 of the drawings, 1 denotes a
20 portion of a unit for filling containers 2 with liquid or powder substances. The unit 1 incorporates a labelling and/or marking machine denoted 3 in its entirety, comprising a feed conveyor 4 rotatable about a vertical axis 5 and appearing as a carousel 6
25 furnished at the bottom with a circular platform 7 of which the periphery presents a plurality of angularly equispaced pedestals 8, each serving to support a relative container 2.

The carousel 6, driven in rotation about the axis 5 by a respective motor 9 (see figure 2) and turning clockwise as viewed in figure 1, is positioned to receive a succession of containers 2 by way of an infeed station 10 where each container is directed onto a relative pedestal 8 by an infeed unit 11 of conventional type, rotating anticlockwise about an axis 12 parallel to the axis 5 of the carousel; the unit 11 comprises a platform 13 and, located above the platform, a disc 14 affording a plurality of peripheral recesses 15 each serving to accommodate a relative container 2 standing on the platform 13. The containers 2 arrive at the infeed unit 11 advancing in single file along a first rectilinear conveyor 16.

The containers 2 are transferred by the carousel 6 from the infeed station 10 onto a circular conveying path 17 terminating at an outfeed station 18, where they are taken up by an outfeed unit 19 of familiar type substantially identical to the aforementioned infeed unit 11 and rotatable similarly anticlockwise about an axis 20 parallel to the axis 6 of the carousel. The outfeed unit 19 comprises a platform 21 and, located above the platform, a disc 22 affording a plurality of peripheral recesses 23 each serving to accommodate a relative container 2 standing on the platform 21. The containers 2 are directed away from the outfeed unit 19 along a second rectilinear conveyor 24, singly and in succession, toward a further machine illustrated schematically as a block denoted 25.

Also indicated schematically in figure 1 are a first and a second applicator and/or marker device of conventional type, denoted 26 and 27 respectively, positioned alongside the final portion of the conveying path 17. The function of the devices in question, in the case of an applicator, is to affix a label (not illustrated) to a predetermined area 28 of the lateral surface 29 presented by each container 2, or in the case of a marker, to apply lettering and/or an image and/or a logo or a graphic symbol to the selfsame predetermined area 28. The devices 26 and 27 might both be label applicators, or both markers, or one might be an applicator and the other a marker.

As shown in figures 1 and 2, the rotary conveyor 4 comprises detection and control means mounted to the circular platform 7 and associated with each of the pedestals 8; such means are denoted 30 in their entirety and comprise CCD type image sensors 31, one to each pedestal 8, able to detect and recognize a predetermined outline 32 on the lateral surface 29 of each container 2 that functions as a reference for the correct positioning of the label and/or mark.

The single CCD image sensors 31 are of conventional type, comprising a processing module 33 that includes a memory 34 capable of identifying and storing the contours of a sample outline for reference purposes, and a sensing and control module 35 such as will compare the degree of similarity between the sample outline and the outline 32 detected on the surface 29 of the container 2.

Also forming part of the detection and control means is a master control unit, shown schematically as a block 36, connected on the input side to the processing module 33 and connected on the output side to the carousel motor 9, also to a set of motors 37 associated each with a respective pedestal 8 in such a way that the single pedestals 8 can be driven in rotation about respective axes 38.

In operation, containers 2 advancing in succession along the first rectilinear conveyor 16 arrive at the infeed station 10, where each is directed by the infeed unit 11 onto a respective pedestal 8 of the rotating circular platform 7 through the action of the motor 9, as the carousel rotates continuously about the relative axis 5.

As the container 2 is carried along the circular conveying path 17, and the respective pedestal 8 caused to rotate about its axis 38 by the motor 37, the lateral surface 29 of the container will be scanned by the detection and control means 30, and more exactly by the image sensor 31 associated with the pedestal 8. During the course of the scanning step, with the pedestal 8 rotating about its axis and thus allowing the image sensor 31 to scan the entire lateral surface 29 of the container 2, the sensor ultimately identifies the predetermined outline 32 aforementioned and returns a corresponding signal to the processing module 33, which by way of the sensing and control module 35 and the memory 34 will verify the degree of similarity between the reference sample

outline and the outline 32 effectively detected on the surface 29 of the container 2.

In the event of a match between the outlines, the processing module 33 relays a corresponding signal to the master control unit 36, which in turn will send control signals to the motor 37 of the pedestal 8 supporting the scanned container 2 in such a way as to rotate the selfsame pedestal 8 through a given angle and bring it into a position corresponding to the position selected and programmed by way of the applicator and/or marker devices 26 and 27.

It will be observed that the containers 2 can be brought to bear alongside the applicator and/or marker devices 26 and 27 with the pedestals 8 either stationary, or continuing to rotate in one or other direction, as long as the aforementioned area 28 of the lateral surface 29 and the application and/or marking position are certain to coincide.

Finally, the detection and control means might consist in a single sensor 39 occupying a fixed position relative to the conveyor 4, in which case the conveyor 4 would be driven intermittently by the motor 9 so that the sensor 39 can scan the lateral surface 29 of each container 2 in turn.